Bristle for a Toothbrush, Particularly for an Electric Tooth brush, and Method for its Manufacture

This is a continuation of International Application No. PCT/EP99/04577, pending, with an International filing date of July 2, 1999.

Field of the Invention

This invention relates to a bristle for a toothbrush, particularly for an electric toothbrush, which is manufactured from a monofilament formed of plastic. The invention relates likewise to a method for manufacturing a bristle for a toothbrush, particularly for an electric toothbrush, in which a monofilament is manufactured from plastic.

Background

A bristle of said type and a method of said type are known from German Offenlegungsschrift DE 196 45 852 A1. This specification contains a description of a monofilament having a non-circular cross section. Subsequent to being extruded the monofilament is twisted about its longitudinal axis and fixed with the aid of chemical agents. This results in a three-dimensionally structured surface which produces a better cleaning effect, particularly when removing plaque.

From German Offenlegungsschrift DE 196 40 853 A1 there is known a bristle for a toothbrush, being comprised of plastic and having several interconnected filaments. Said filaments are wound or braided and joined together with the aid of chemical agents. At the free end of the bristle manufactured from these filaments a fanning effect is accomplished by subjecting the free end of the bristle to a mechanical processing operation, for example.

It is also known to perform such fanning of the free end of a bristle in cases where a monofilament is involved. In this case it is necessary for the free end of the bristle to be processed by a cutting tool or the like.

Summary of the Invention

It is an object of the present invention to provide a bristle manufactured from a monofilament, with the possibility of fanning the free end of the bristle in simple manner.

This object is accomplished by the invention with a bristle of the type initially referred to in that the bristle has at least two zones plus at least one point of preferred breaking in its cross section. Further, the object is accomplished with a method of the type initially referred to in that the monofilament is manufactured in such a way that it has at least two zones plus at least one point of preferred breaking in its cross section.

One or several points of preferred breaking are formed within the monofilament by the zones which according to the invention exist in the cross section of the monofilament and are filled preferably with plastic. These points of preferred breaking are approximately located where the at least two zones adjoin one another. A bristle manufactured from such a monofilament no longer requires the use of elaborate cutting tools or the like for it to be fanned at its free end. Instead it suffices for the free end of the bristle to be mechanically processed. Such mechanical processing can be performed, for example, by upsetting, knocking, rounding, cutting, grinding, polishing or beating the free end of the bristle. As a result of this mechanical processing of the free end of the bristle, the different zones present in cross section will break at the described points of preferred breaking. Hence there will result at the free end of the bristle at least two sub-filaments corresponding to the at least two zones of the original monofilament. If the original monofilament has a multiplicity of zones in cross section, the mechanical processing of the free end of the

Further features, application possibilities and advantages of the present invention will become apparent from the subsequent description of embodiments of the invention illustrated in the Figures of the accompanying drawings. It will be understood that any features described or represented by illustration, whether used singularly or in any combination, form the subject-matter of the present invention, irrespective of their summary in the claims or their back reference and irrespective of their wording and representation in the description and the drawings, respectively.

Brief Description of the Drawings

FIG. 1a is a schematic view, in cross section, of a monofilament illustrating a first embodiment, comprising two or more pairs of plastic materials, one zone being essentially star-shaped while the other zones are shaped in an essentially segmental or sectoral configuration;

FIG. 1b is a schematic view, in cross section, of a monofilament illustrating a second embodiment, having zones shaped in a segmental or sectoral configuration;

FIG. 2a shows schematic longitudinal sectional views of an embodiment of an extrusion die used for manufacturing a monofilament;

FIG. 2b shows schematically cross sectional views of the monofilament as it passes through the extrusion die of FIG. 2a;

FIG. 3a is a schematic cross sectional view of an embodiment of a monofilament having a non-circular cross section and a cavity or a further plastic in longitudinal direction;

FIG. 3b is a schematic cross sectional view of an embodiment of a monofilament having a non-circular cross section, a cavity or a further plastic, and points of preferred breaking in longitudinal direction;

FIG. 3c is a schematic cross sectional view of an embodiment of a monofilament having a non-circular cross section and several cavities or a further plastic in longitudinal direction; and

FIG. 4 is a schematic side view of a reel from which a monofilament is drawn.

Detailed Description of Preferred Embodiments

FIG. 1a shows the first embodiment of a monofilament 1 in a cross sectional view. The monofilament 1 has several zones 2, 3 and 4, of which at least zone 4 on the one hand and zones 2, 3 on the other hand are manufactured from plastics with different properties. In addition, it is also possible, of course, to arrange different plastics in the zones 2, 3, which may also have differences to the plastic in zone 4. The zones 2, 3 are separated from each other by the zone 4, with the possibility for the plastic in zones 2, 3 to have different filler materials or colors. The zone 4 may be constructed of bars arranged in star shape and essentially positioned in point symmetry and/or mirror symmetry with the central longitudinal axis of the monofilament 1. The zones 2, 3 are constructed in segment or sector form between the bars of zone 4 arranged in star shape. In this embodiment there are a total of eight zones 2, 3, but it will be understood, of course, that any number of zones 2, 3 and 4 may be selected.

The monofilament 5 seen in the cross sectional view shown in FIG. 1b has successive zones 6, 7, each of which is

If a monofilament according to FIG. 1b is used, the points of preferred breaking 8 of the monofilament 5 will break open at the free end of the bristle in question. Hence a total of eight individual sub-filaments are formed at the free end of the bristle.

If a monofilament according to FIG. 2b is used, the three zones 17 of the common strand 15 will break open at the free end of the bristle. Hence three separate sub-filaments are formed at the free end of the bristle.

If monofilaments according to FIGS. 3a, 3b, 3c are used, these monofilaments will break open in particular at the points of preferred breaking 35. Individual sub-filaments are thus formed at the free ends of the bristles.

Hence the mechanical processing of the free ends of the bristles required for rounding said ends results simultaneously in the splitting of the free ends of the bristles in their longitudinal direction. Depending on the type and intensity of mechanical processing applied to the free ends of the bristles it is possible to control the extent to which the bristles split in longitudinal direction. Splitting preferably extends over approximately 10% to approximately 25% of the length of the bristle.

The bristles and tufts of bristles manufactured by this method are used preferably in an electric toothbrush. They are intended for use in particular in a round headed toothbrush, preferably within its inner field.

We claim: